Pablo Rio 4K

Product Guide

V2.0

Turnkey range and system specifications
Minimum system requirements
Software description

Pablo Rio 4K

Pablo Rio 4K is a range of software high quality color and finishing systems running on standard PC hardware. The Pablo Rio 4K range provides SD, HD, 2K, 4K, 6K, stereo3D and high-frame rate support. The comprehensive integrated toolset includes conform, color, editing, effects, text, paint and multi-format versioning enabling Pablo Rio 4K to complete a wide range of post production tasks. Pablo Rio 4K efficiently handles today's digital capture formats such as RED HDRx, Sony F65, SStP, ARRI, Canon and easily integrates Into data-centric post pipelines.

Pablo Rio 4K offers a wide range of configuration choices

- Available as software only or as a range of turnkey solutions
- Storage architecture – local workspace, SAN, NAS or a combination
- Support for up to 1 or 2 Tesla Kepler K20 GPUs
- Grading control surface - Neo, Neo Nano or no panel at all
- File and Video workflow

Key Features

- Runs on commercial off the shelf (COTS) hardware
- Uses Nvidia Maximus multi-GPU technology for maximum interactive performance
- Includes Edit, MLTFX, Effects (including Paint), Utilities and Scribe modules
- Real-time interactive operation on images up to 6K 16 bit and beyond
- Full stereo toolset includes geoFix for auto geometry fixing, autobalance for color matching of eyes, X/Y vergence and floating window controls

About this Guide

This guide provides comprehensive information on the capabilities of the Pablo Rio 4K software and turnkey systems specifications. It also details turnkey system options and the minimum system requirements for building your own system to run the Pablo Rio 4K software.

Please contact your account manager or mail marketing@quantel.com with any questions.

Pablo Rio 4K Turnkey System Specifications

Pablo Rio 4K turnkey systems provide guaranteed out-of-the-box performance for those customers not wishing to build their own system. Pablo Rio turnkey systems are available in a wide range of configurations to allow customers to tailor the system to their specific needs. Pablo Rio Turnkey systems are supplied fully assembled, configured and tested by Quantel to provide the ultimate in performance and are supported by Quantel 24/7 worldwide.

Pablo Rio 4K Range – System Configurations

	Pablo Rio 4K 500-012	Pablo Rio 4KO 500-013	Pablo Rio 4KHFR 500-014
Video i/o	Quantel	AJA Corvid Ultra	AJA Corvid Ultra
Tesla K20	x1	x1	x2
Disk Arrays	x1 External	x1 External	x2 External
HD RGB 10bit @25fps	25 hours	25 hours	50 hours
2K RGB 10bit @24fps	16 hours	16 hours	32 hours
4K RGB 10bit @24fps	6 hours	6 hours	12 hours
Real-time off disk playback*	2880x2160 @50P 4096x2160 @30P 5120x2560 @25P	2880x2160 @50P 4096x2160 @30P 5120x2560 @25P	5120x2700 @30P 6144x3160 @24P 4096x2160 @60P
Max Output Resolution	2048x1080 @25P	4096x2160 @30P	4096x2160 @60P

2k = 2048 x 1556
4k = 4096 x 2160

* All resolutions are 16bit. Full real-time playback details on page 12

There is a utility that details storage capacity across a wide range of formats available from this webpage. It answers the simple question - how much storage does Pablo Rio have in a particular format?

Full details on all machine specifications follow.

500-012 Pablo Rio 4K

Supermicro Superserver 7047GR-TRF-FC465
2 x Intel Xeon E5-2687W
3.1Ghz 8 Cores \ 16 Threads
32GB RAM (8x4GB) 1600Mhz REC ECC DDR3 DIMMs

1 x Nvidia Tesla K20 – image processing
1 x Nvidia Quadro K600 card - UI display

2 x Western Digital VelociRaptor WD2500HHTZ, 250GB – mirrored system/data drives
2 x Western Digital VelociRaptor WD5000HHTZ, 500GB – mirrored audio drives

1 x DVD-RW Drive
9 x USB2 ports
2 x RS422 VTR Control

Dual redundant 1620W PSUs
Supermicro mobile rack
Keyboard and mouse
Wacom Intuos 5 tablet and pen (as configuration options below)

	No Panel	Neo Nano Panel	Neo Panel
Large Tablet	✓	x	x
Small Tablet	x	✓	x
No Tablet	x	x	✓

VTR Serial Interface

2x RS422 9-pin VTR serial interface ports are provided on the rear of the machine

Standard Video and Audio interfaces

2x multi-format 3G/HDSDI/SDI 10bit inputs with up to 16 channels of embedded audio

- Inputs auto sense any supported format

2x multi-format 3G/HDSDI/SDI 10bit outputs with up to 16 channels of embedded audio

- 2 Parallel outputs are available when operating in single link modes

Supported Video input/output formats

Format Parameters				Video Interface Support		
Size	**Framerate**	**444/422**	**Stereo3D**	**Single Link SDI**	**Dual link SDI**	**3G**
SD	25, 29.97	422	No	✓	x	x
		444	No	x	✓	x
HD 720	50, 59.94, 60	422	Yes	✓	x	x
HD 1080	23.98, 24, 25, 29.97, 30	422	No	✓	x	x
			Yes	L+R or Multiplex	x	x
		444	No	x	✓	✓
			Yes	x	Multiplex	L+R
HD 1080	47.95, 48, 50, 59.94, 60	422	No	x	✓	✓
2K	23.98, 24, 25	444	No	x	✓	✓
			Yes	x	Multiplex	L+R

Notes

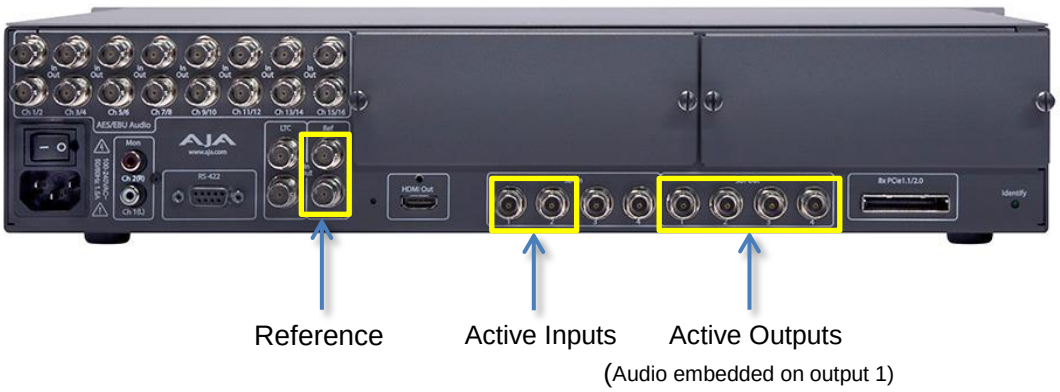
- 2K is 2048 x 1080 and is supported for output only
- 422 refers to Digital Component YCrCb, often called YUV
- 444 refers to 444 RGB
- Stereo 3D Multiplex is one stream with the L & R signals multiplexed together in side by side, top bottom, vertical interlace, checkerboard or flicker modes.
- Stereo 3D L+R is twin streams, one for L and one R

500-013 Pablo Rio 4KO

The Pablo Rio 4KO has the same system specifications as the Pablo Rio 4K except the Quantel i/o card is replaced with the AJA Corvid Ultra.

The AJA Corvid Ultra provides 4K output and replaces the standard interfaces with:

- 2x multi-format 3G/HDSDI 10bit inputs with up to 16 channels of embedded audio
  - Inputs auto sense any supported format
- 4x multi-format 3G/HDSDI 10bit outputs with up to 16 channels of embedded audio



AJA Corvid Ultra Supported Output Formats – Mono

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4	Output Link Selection (default)
SD YUV 422 (576/486)	25, 29.97	1.5G				single
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G				single
HD/2K RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G			dual
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G				Level B 3G
1080/2K (P) YUV 422 Level A or B	47.95, 48, 50, 59.94, 60	3G				Level A 3G
720P YUV 422	50, 59.94, 60	1.5G				single
Quad HD YUV 422 (UHD1)	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	single
4K YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	single
Quad HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G
4K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G	3G	3G	Level B 3G

AJA Corvid Ultra Supported Output Formats – Stereo3D

3D Stereo Registry setting "Stereo 3D 2nd output BNC (2,3 or 4)"=3	**FPS**	**SDI 1**	**SDI 2**	**SDI 3**	**SDI 4**	**Output Link Selection** (default)
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G		1.5G		single
HD/2K RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G	1.5G	1.5G	single
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G		3G		Level B 3G
720P YUV 422	50, 59.94, 60	1.5G		1.5G		single
1080/2K (P) YUV 422 Level A or B	47.95, 48, 50, 59.94, 60	3G		3G		Level A 3G

3D Stereo Registry setting "Stereo 3D 2nd output BNC (2,3 or 4)"=2	**FPS**	**SDI 1**	**SDI 2**	**SDI 3**	**SDI 4**	**Output Link Selection** (default)
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G	1.5G			single
HD/2K RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G	3G			Level B 3G
720P YUV 422	50, 59.94, 60	1.5G	1.5G			single
1080/2K (P) YUV 422 Level A or B	47.95, 48, 50, 59.94, 60	3G	3G			Level A 3G

Notes

- 2K = 2048 x 1080, Quad HD = 3840 x 2160, 4K = 4096 x 2160
- When selecting the output frame rate in the user interface the appropriate output link choices are provided in the selector menu.
- Reference must be the same frame rate as the output in order to lock.

Registry Setting Location

HKEY_LOCAL_MACHINE\SOFTWARE\QUANTEL\Pablo Rio\Quantel\AVIO3PCardDriver\Custom settings

AJA Corvid Ultra Supported Input Formats

Mono	FPS	SDI 1	SDI 2	SDI 3	SDI 4
SD YUV 422 (576/486)	25, 29.97	1.5G			
HD YUV 422	23.98, 24, 25, 29.97, 30	1.5G			
HD RGB 444 Dual Link	23.98, 24, 25, 29.97, 30	1.5G	1.5G		
HD RGB 444 Level B	23.98, 24, 25, 29.97, 30	3G			
1080P YUV 422 Level A or B	47.95, 48, 50, 59.94, 60	3G			
720P YUV 422	50, 59.94, 60	1.5G			

Notes

- VPID – Vertical Payload Identifier needs to be present for the AJA Corvid Ultra to correctly detect the input standard.
- 3D Stereo input is not supported

500-014 Pablo Rio 4KHFR

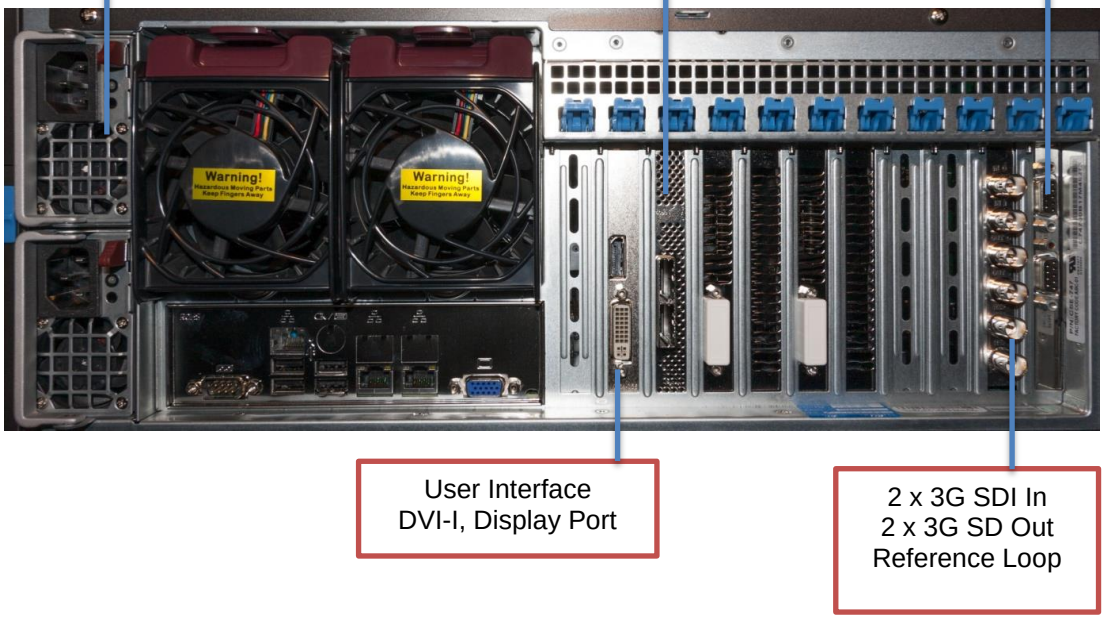
The Pablo Rio 4KHFR has the same system specifications as the Pablo Rio 4KO but includes an additional Tesla K20 and a second SAS disk array. It supports the following QHD/4K High Frame Rates.

AJA Corvid Ultra 4K HFR Supported Output Formats

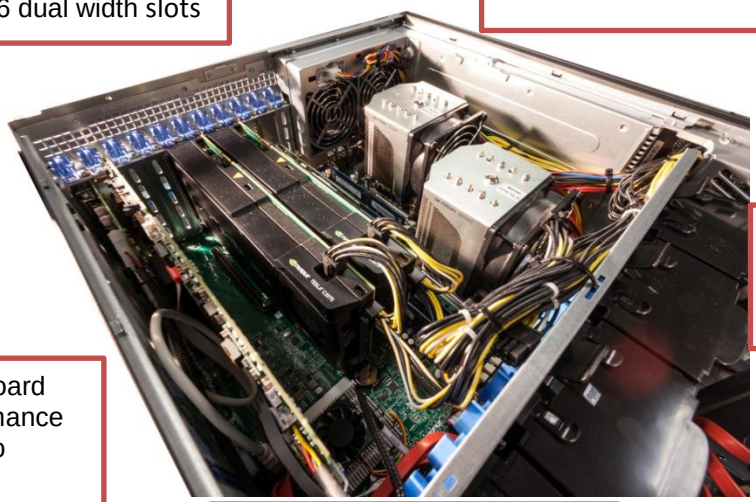
Mono	**FPS**	**SDI 1**	**SDI 2**	**SDI 3**	**SDI 4**	**Output Link Selection** (default)
Quad HD YUV 422 (UHD1) Level A or B	47.95, 48, 50, 59.94, 60	3G	3G	3G	3G	Level A 3G
4K YUV 422 Level A or B	47.95, 48, 50, 59.94, 60	3G	3G	3G	3G	Level A 3G

Pablo Rio 4K Turnkey System Interfaces

2 Teslas, single array, standard video i/o system pictured



Inside a Pablo Rio 4K Turnkey System



Motherboard Slot Utilisation

Available Slots	Pablo Rio 4K	Pablo Rio 4KO	Pablo Rio 4KHFR
PCI-E 3.0 x16 (dual width)	Standard Video I/O	AJA Corvid Ultra Interface	AJA Corvid Ultra Interface
PCI-E 3.0 x16 (dual width)	Spare	Spare	Spare
PCI-E 3.0 x16 (dual width)	Spare	Spare	Tesla K20
PCI-E 3.0 x16 (dual width)	Tesla K20	Tesla K20	Tesla K20
PCI-E 3.0 x8 (x16 connector)	Quadro K600	Quadro K600	Quadro K600
PCI-E 3.0 x8	SAS2 RAID Controller	SAS2 RAID Controller	SAS2 RAID Controller
PCI-E 2.0 x4 (x8 connector)	Spare	Spare	SAS 2 Interfaces

- A maximum of two Teslas can be supported in a Pablo Rio 4K turnkey system
- The Pablo Rio 4KHFR with two external arrays requires two additional SAS connectors that fill a back panel slot.
- The RS422 VTR interface also fills a back panel slot however this can be fitted in the space adjacent to the video i/o card which is a single width card in a dual width slot.

User Interface and audio monitoring

- Monitoring is not supplied by Quantel as part of any Turnkey system.
- The user interface is optimised for 1920 x 1200, however it is also tested and will work at 1920 x 1080
- Audio is output as embedded audio on the HDSDI video outputs.

Performance

- Store any resolution on disk up to 8k x 8k
- Real-time playback of soft mounted files from 3rd party workspace.
  (Requires fast storage on a high bandwidth connection)
- 48 fps soft-mounted RED Epic (up to 5120 x 2700) stereo playback - 1/8 preview res selected in the RED settings
- 4K soft mounted RED files playback realtime using 1/2 med preview resolution
- The formats that can be played in real time from local workspace are shown in the chart on the following page
- The impact of the number of Teslas on the effects that can be played back without rendering in real time is shown in the chart on page 13

Real-time playback performance figures – MLT FX and Edit play with LUT on

Mono

Source Format		Frame rate (fps)				
Resolution	Bit Depth	24	25	30	50	60
1920x1080	10					
2048x1556	10					
	16					
2880x1620	10					
	16					
2880x2160	10					
	16					
4096x2160	10					
	16					
5120x2560	10					
	16					
5120x2700	10					
6144x3160*	16					

Stereo 3D

Source Format		Frame rate (fps)				
Resolution	Bit Depth	24	25	30	50	60
1920x1080	10					
2048x1556	10					
	16					
2880x1620	10					
	16					
2880x2160	10					
	16					
4096x2160	10					

Pablo Rio 4K and 4KO (x1 Tesla K20, x1 array)

Pablo Rio 4K and 4KO (x2 Tesla K20, x1 array)

Pablo Rio 4KHFR only (x2 Tesla K20, x2 arrays)

Notes:

1. *6K Playback is also available on the Pablo Rio 4K and 4KO if fitted with two disk arrays and two Kepler K20s
2. All sources use 444 color encoding
3. GUI update during play is turned off
4. The output resolution used in the table is Quad HD for the Pablo Rio 4KO and HD for the Pablo Rio 4K. 50p and 60p output was set to 1080P on the Pablo Rio 4KO and 720P on the Pablo Rio 4K.
5. Output sizing is performed in the GPUs so as other output resolutions are supported in future in the output hardware they can also be supported in the system.

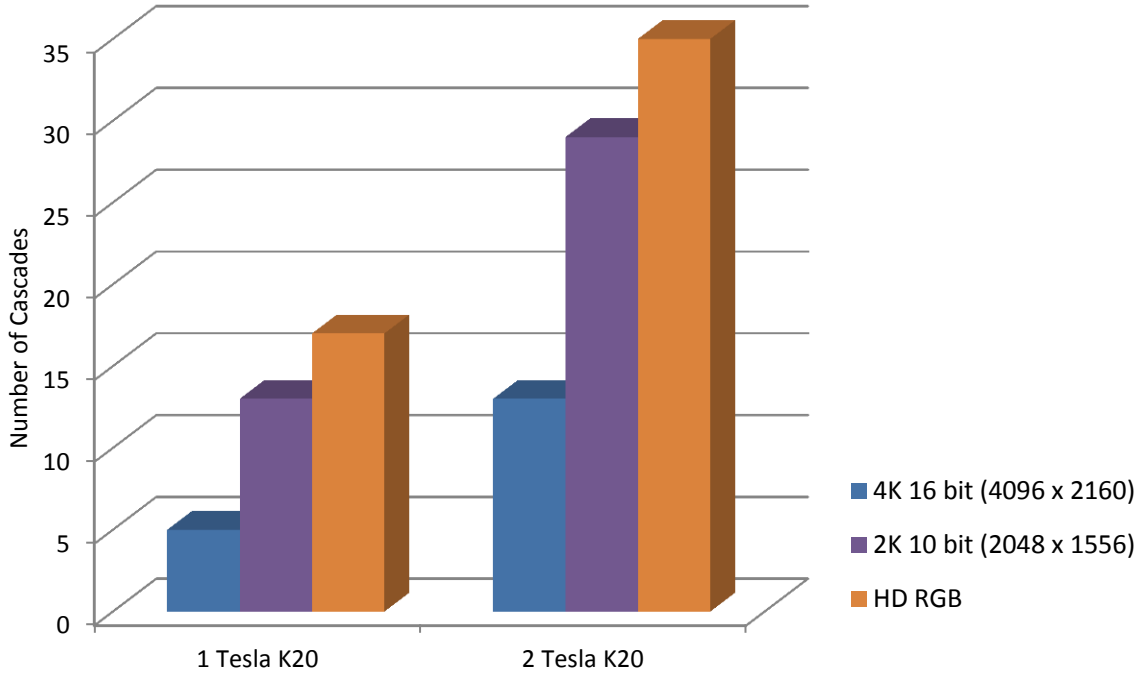
6. Tests performed using Block Mode Disk Addressing
7. Playback performance figures shown are with Quantel supplied local workspace. Customers may provide their own storage to be used as local workspace – see the Software minimum system requirements section of this guide for details. Quantel cannot guarantee the performance of hardware it has not provided.

Impact of number of Teslas on Real-time Effects Performance

An indication of the number of cascades that can be played back in real-time is shown in the chart below.

Level of real-time playback with number of colour cascades (more is better)

All cascades had a grade, most with soft shapes, several also with HSL keys.



Pablo Rio 4K Range – Storage Capacities

	Pablo Rio 4K 500-012	Pablo Rio 4KO 500-013	Pablo Rio 4KHFR 500-014
Disk Arrays	**x1 External (18TBs)**	**x1 External (18TBs)**	**x2 External (36TBs)**
HD RGB 10bit @25fps	25 hours	25 hours	50 hours
2K 1080 RGB 10bit @24fps	23 hours	23 hours	46 hours
2K 1080 RGB 16bit @24fps	14.7 hours	14.7 hours	29.4 hours
2K 1556 RGB 10bit @24fps	16 hours	16 hours	32 hours
2880x2160 RGB 10bit @24fps	8.3 hours	8.3 hours	16.6 hours
2880x2160 RGB 16bit @24fps	5.3 hours	5.3 hours	10.6 hours
4K 2160 RGB 10bit @24fps	5.8 hours	5.8 hours	11.6 hours
4K 2160 RGB 16bit @24fps	3.7 hours	3.7 hours	7.4 hours
6144x3160 RGB 16bit @24fps	1.7 hours	1.7 hours	3.4 hours

Pablo Rio Turnkey System Options

480-123 Neo Panel

The Neo Panel provides the ultimate color correction environment for Pablo Rio.
Neo lets users access Pablo Rio's entire creative colour toolset quickly and easily without the need for complex menus.
Its intuitive design allows any colorist to quickly migrate to the creative power of Pablo.
Includes tablet and transport controls

480-223 Neo Nano Panel

Smaller footprint control surface
Has the majority of the Neo panel functions via a scrollable menu system
Comprehensive color correction in a small package

500-133 Additional Tesla K20

Additional Nvidia Tesla K20
A maximum of 2 Teslas can be fitted into a turnkey system subject to motherboard slot availability
See table page 9

500-127 Remove Workspace (per array)

This option is for customers wishing to provide their own workspace, it removes the disk array from turnkey systems.

Note:

Quantel cannot guarantee the performance of hardware it has not provided.

500-111 Additional local Workspace – Pablo Rio 4K range

The second array requires an additional back panel slot for two additional SAS connectors. The new SAS connectors and internal cabling to connect them to the internal RAID controller are provided with the second array.

Dual array systems use HD mini-SAS SF 8644 connectors

A maximum of two arrays can be connected.

500-123 Upgrade from Pablo Rio 4K to 4KO

This upgrade replaces the standard video i/o in the Pablo Rio 4K with the AJA Corvid Ultra to provide 4K monitoring on quad 3G SDI

See p 6-8 for details of supported formats

480-134 Intel 10Gb Ethernet card

Intel X520-SR1 single channel 10Gb ethernet adapter

500-143 Deliver to sQ

This allows any Pablo Rio to be connected to an Enterprise sQ Server system and deliver a clip in the server format no matter what the original resolution.

Requires an Enterprise sQ Server system with a QTube Transformer.

Support policy for PC components

Customers are free to add PC components such as PCIe cards and disk drives not purchased from Quantel to their Pablo Rio Turnkey system. In general any Windows 7 64bit qualified device can be added. Quantel reserves the right to ask customers to remove such components when diagnosing issues. Quantel will not provide support on components not purchased through Quantel.

Pablo Rio 4K Software (500-100)
Minimum System Requirements

Building a Pablo Rio 4K

If a fully tested and supported turnkey system from Quantel is not required, and you are prepared to source and support the hardware yourself, Pablo Rio is available as software to run on your choice of system.

When building a Pablo Rio 4K system it is important to choose the correct hardware components to achieve the level of performance needed.

Whatever PC system is to be used there are some minimum requirements that need to be met:

- Windows 7 64bit Professional
- 2 x Intel Xeon E5-2690 2.9Ghz 20MB 1600 8C
- 32 GB RAM
- Nvidia Quadro K600 – used for UI
- Nvidia Tesla Kepler K20 GPU card - used for image processing to deliver real-time performance
- Quadro/Tesla driver version 310.90 or later
- Fast storage with a high bandwidth connection
- 250GB hard drive – system/data drives
- 500GB hard drive – audio drive
- Mouse and keyboard

Consideration needs to be given to the other interface cards that may be required such as 10Gb network interface card for NAS connection, a FC HBA for SAN connection, a SAS RAID card for an external storage array or a RED Rocket card. The detailed choices made will impact the number of slots required on the PC motherboard and determine the suitability of specific products.

The PCIe interface allows cards to be used in slots that may not achieve the cards full potential performance. For example a PCIe x8 RAID controller will work in a x4 motherboard slot. Limiting throughput in this way may impact on the overall system performance with high resolutions and high frame rates. The best plan is to avoid such compromises entirely.

Pablo Rio 4K is designed to use modern PC components to their maximum capabilities. This requires adequate power supplies and generates heat. When specifying a PC system on which to run Pablo Rio 4K consideration needs to be given to the rated capacity of the PC power supply - don't forget to allow for any add-in boards and multiple Teslas if you are using them.

It's vital to provide adequate case cooling in addition to the CPU fans. The cooling should be designed to ensure that module temperatures are stable and within specification during long periods of the PC running at maximum utilisation.

VTR Serial Interface

2x RS-422 9-pin VTR serial interface ports are provided by Quantel as part of the software package. The supplied card requires an unused back panel slot and connects to a USB header present on all PC motherboards. It does not occupy a PCI slot although it may block one if no spare back panel slots are present.

Quantel Software test platform

Quantel test Pablo Rio 4K software on our turnkey system (specification page 4) and the following generally available PC.

HP Z820 Workstation

- HP Z820 1125W 90 Efficient Chassis
- Microsoft Windows 7 Professional Edition 64bit OS
- 2 x Intel Xeon E5-2690 2.9Ghz 20MB 1600 8C
- 32GB DDR3-1600 (8x4GB) 2 CPU RAM
- 1 x Nvidia Tesla K20 - Quadro/Tesla driver version 310.90 or later
- 1 x Nvidia Quadro K600
- 2 x 300GB 15K RPM SAS hard drives – Mirrored System / Data drives
- 2 x 600GB 15K RPM SAS hard drives – Mirrored Audio drives
- HP USB Keyboard
- HP USB Laser Scroll Mouse
- 16x SuperMulti DVDRW SATA 1st ODD
- 2 x RS422 VTR Control

The motherboard slot utilisation in the Quantel test configuration is:

PCI-E x4	VGA (Quadro K600)
PCI-E x16	Kepler K20 (this dual width card blocks a motherboard PCI slot)
PCI-E x16	AJA Kona 3G
PCI-E x4	Fibre channel HBA for connection to SAN
PCI-E x16	SAS Raid controller card

Note:

The HP Z820 does not have enough motherboard slots to support dual Tesla operation with video i/o without installing the RAID controller card in a PCIe x4 slot. This potentially compromises performance at high resolution and high frame rates.

Storage Test Configuration

Quantel test with a RAID 60 (2 x 10+2) external SAS array with 24 10,000 rpm disks capable of delivering 2GB/sec read and 1.7GB/sec write. As 3rd party storage and connection bandwidths vary between various suppliers Quantel cannot guarantee real-time performance on software only systems. Quantel guarantee performance on turnkey systems.

Video input and output

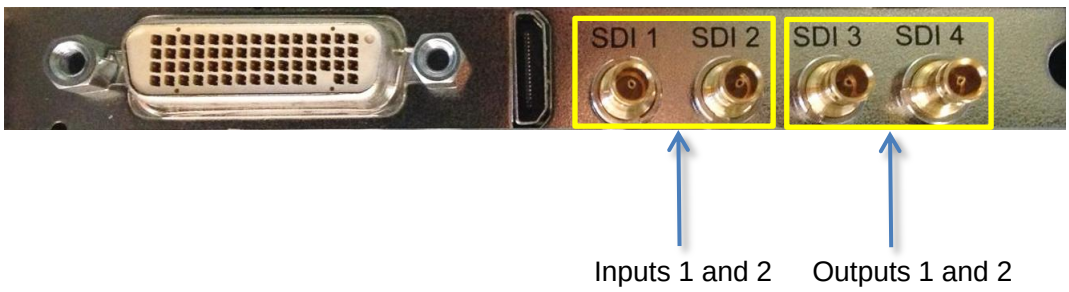
Pablo Rio 4K software supports the AJA Corvid Ultra or AJA Kona 3G to provide video input and output. They both require at least an 8x PCIe 2.0 motherboard slot.
The AJA Corvid Ultra supports SD/HD inputs and HD, 2K and 4K outputs on 1.5/3G SDI connections.
The AJA Kona 3G supports SD/HD inputs and SD/HD/2K outputs on 1.5/3G SDI connections.
The i/o formats supported will depend upon the performance of your storage subsystem and on the number of Teslas fitted – see pages 6 - 8 for the AJA Corvid Ultra formats supported on the turnkey systems.

The latest driver version for both cards can be found in the Pablo Rio software directory here:
C:\Data\PabloRio xxxxx\DLL_Data\Quantel\AVIO3PCardDriver
Installation instructions for Driver and Firmware can be found in readme.txt file in the above folder.

AJA Kona 3G video i/o card

The AJA Kona 3G card is supported on software Pablo Rio 4K systems.

The connectors for use in Pablo Rio are configured as shown below.



Standard Video and Audio interfaces

2x multi-format 3G/HDSDI/SDI 10bit inputs with up to 16 channels of embedded audio

- Inputs auto sense any supported format

2x multi-format 3G/HDSDI/SDI 10bit outputs with up to 16 channels of embedded audio

- 2 Parallel outputs are available when operating in single link modes

AJA Kona 3G Supported Video input/output formats

Format Parameters				Video Interface Support		
Size	**Framerate**	**444/422**	**Stereo3D**	**Single Link SDI**	**Dual link SDI**	**3G**
SD	25, 29.97	422	No	✓	x	x
HD 720	50, 59.94, 60	422	Yes	✓	x	x
HD 1080	23.98, 24, 25, 29.97, 30	422	No	✓	x	x
			Yes	L+R	x	x
		444	No	x	✓	✓ Level B only
			Yes	x	x	L+R Level B only
HD 1080	50, 59.94, 60	422	No	x	x	✓ Level A only
2K	23.98, 24, 25	444	No	x	✓	✓ Level B only
			Yes	x	x	L+R Level B only
		422	No	✓	x	x
			Yes	L+R	x	x

Notes

- 2K is 2048 x 1080 and is supported for output only
- 422 refers to Digital Component YCrCb, often called YUV
- 444 refers to 444 RGB
- Stereo 3D L+R is twin streams, one for L and one R

Monitoring

The user interface is optimised for 1920 x 1200, however it is also tested and will work at 1920 x 1080.

Audio is monitored via embedded audio on the video one output of the AJA Corvid Ultra or AJA Kona 3G.

An audio capable device must be detected for the software to boot, if an AJA Corvid Ultra or AJA Kona 3G is not fitted then an audio device on the PC motherboard can be used.

If no video card or motherboard audio device is present then an external HDMI audio de-multiplexer can be used.
e.g. CYP AU-11SA HDMI Audio De-Embedder with Repeater, or an audio capable HDMI monitor/TV, e.g. LG Flatron W2442PE connected to the Displayport out on the UI Graphics card.

Performance

The following real-time playback performance can be achieved using the storage test configuration described above. Quantel cannot guarantee real-time performance on software only systems.

Real-time playback performance figures

MLT FX and Edit play with single disk array and LUT on

Mono

Source Format		Frame rate (fps)				
Resolution	Bit Depth	24	25	30	50	60
1920x1080	10	■	■	■	■	■
2048x1556	10	■	■	■	■	■
	16	■	■	■	■	■
2880x1620	10	■	■	■	■	■
	16	■	■	■	■	■
2880x2160	10	■	■	■	■	■
	16	■	■	■	■	
4096x2160	10	■	■	■		
	16	■	■	■		
5120x2560	10	■	■	■		
	16	■	■			

Stereo 3D

Source Format		Frame rate (fps)				
Resolution	Bit Depth	24	25	30	50	60
1920x1080	10	■	■	■	■	■
2048x1556	10	■	■	■	■	
	16	■	■	■	■	
2880x1620	10	■	■	■		
	16	■	■	■		
2880x2160	10	■	■	■		
	16	■	■	■		

■ x1 Tesla K20

All sources 444 color encoding GUI update during play turned off

The output resolution used in the table is Quad HD for the AJA Corvid Ultra. HFR output was set to 1080P on the AJA Corvid Ultra.
Output sizing is performed in the GPUs so as other output resolutions are supported in future in the output hardware they can also be supported in the system.

Note: All Performance Tests Use Block Mode Disk Addressing

Storage Requirements and configurations

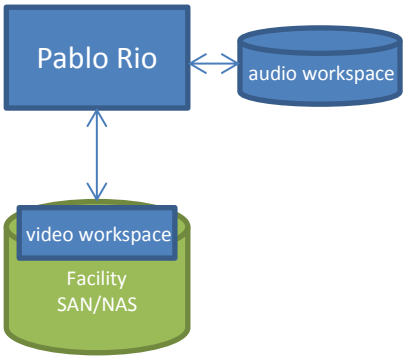
Pablo Rio 4K will work with media on either local workspace or soft mounted on 3rd party storage, or a combination of both. The local workspace can be configured as direct attached storage e.g. an external SAS Raid array or on a SAN/NAS.

In order to achieve real-time playback of soft mounted 2K dpx files from networked storage then a minimum of 4K FC or 10G Ethernet connectivity is required. The disk subsystem should be able to supply similar performance to that described in the Storage Test Configuration for reliable playback.

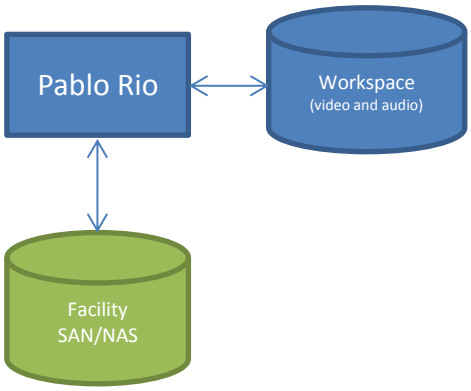
The audio workspace always needs to be configured on an internal direct attached drive (or drives) dedicated to audio. It must not be shared with the system/data drive or the video array drives.

Having the audio workspace on network storage is not supported.

Possible configurations



Everything on facility SAN/NAS
No local video workspace
Only complex renders and audio stored in private workspace
Render on Export to facility SAN/NAS



Sources on facility SAN/NAS
Local workspace provides guaranteed access and bandwidth for playout
Render on export or export to facility SAN/NAS

Pablo Rio 4K Software and Options

480-123 **Neo Panel**

The Neo Panel provides the ultimate color correction environment for Pablo Rio. Neo lets users access Pablo Rio's entire creative colour toolset quickly and easily without the need for complex menus.
Its intuitive design allows any colorist to quickly migrate to the creative power of Pablo. Includes tablet and transport controls.

480-223 **Neo Nano Panel**

Smaller footprint control surface.
Has the majority of the Neo panel functions via a scrollable menu system.
Comprehensive color correction in a small package.

500-125 **HFR Option for Pablo Rio 4K Software**

This option enables 50, 59.94 and 60 fps high frame rates for QHD and 4K on the AJA Corvid Ultra.
Note: The disk sub-system / raid controller topology must be capable of delivering 4GBs/sec for 4K 16bit @60fps

500-143 **Deliver to sQ**

This allows any Pablo Rio to be connected to an Enterprise sQ Server system and deliver a clip in the server format no matter what the original resolution.
Requires an Enterprise sQ Server system with a QTube Transformer.

Software specification

The Pablo Rio software is modular. Each module is accessed from the edit desk or via task bar at the bottom of the User interface.

Library

- Project-based or flat file library stores rushes, edits, packs, settings and clip metadata
- Fixed or floating library
- Technical metadata includes resolution, bit depth, scan, colorspace, pixel aspect ratio, reference black/white levels, source timecode, keycode, render state and many more
- User metadata includes project, originator, name, description and owner
- User defined clip colours in the library
- User defined library view including any or all fields in any order
- Fast search or sort on any field
- Unlimited user defined bins based on folders or search results
- Display entries as text, thumbnail or both
- Browse, scroll and play clips directly in the library
- Edit from library
- Nested folders for easy project organisation
- Define folder to store new material
- Modify clip attributes in the library
- Graphical indication of clip, rush, edit, stereo clip, clip with key or setting
- Graphical display of effects settings with thumbnail image
- Auto select of relevant settings, DVE, key, colour etc., when in MLTFX and Effects
- Drag settings directly from library onto any track in MLTFX
- Unique file ID prevents accidental overwrite
- FrameMagic™ allows instant and safe deletion of material to free up disk space without needing to consolidate
- Analyse Space – will show the percentage of local workspace any clip or folder will free up if deleted

Edit

- Multilayer Resolution Co-existence™ timeline
- Multilayer stereo timeline – layer and combine stereo tracks as if they were normal mono tracks
- Freely mix resolutions on the timeline without rendering
- Timeline, picture or storyboard editing with cuts, wipes, dissolves
- Gestural or keyboard based editing
- Matchframe for quickly finding the original source material from an edited clip, even with stretched clips
- Pan and scan on output
- Soft mount on timeline RED, DPX, TIFF, CIN, MXF-wrapped DNxHD, Sony F65, SStP, XAVC, Go Pro MP4, P2, Quicktime ProRes, ARRI RAW, Canon RAW, Cinema DNG and XDCAMHD formats
- 48fps Stereo3D support for soft mounted RED Epic formats up to 5120 x 2700
- Soft mounted RED media always has the decode live and adjustable on the timeline

- Soft mounted F65 media always has the decode live and adjustable on the timeline
- RED 48fps and HDRx supported
- Localise soft mounted media (if required) via the timeline, desktop or clips library
- Frame accurate editing at 23.98, 24, 25, 29.97,30, 47.95, 48, 50, 59.94, 60 fps with appropriate timecode
- View either source or destination timecode, or frame count
- Multi-level undo and redo
- Video and audio Fit to Fill editing
- Insert, replace and swap edit modes
- Visual and numeric single and multi-shot trimming
- Complex trim across multiple tracks and layers
- Extend edit to current position
- Segment highlights for easier identification and navigation
- Fully automatic management of tail frames with visible indication of tails and duration
- Automatic unlimited extend of repeated frames
- Audio video sync display with lock sync trim mode
- Industry standard keyboard shortcuts
- Linear or profile video speed changes in timeline or on Desktop
- Apply custom transitions designed in Effects Module that use any effect tool including plug-ins
- Uncommitted edits and transitions
- Multi-resolution commit of edits
- Flatten multilayer timelines with a top down view
- Segment out with or without tails
- Auto rebuild of transitions after trim or effects changes
- Auto rebuild of transitions for different aspect ratio version
- Split edits into their component rushes with or without tails
- Desktop scene detect
- Video Guide track offline comparison with split screen or mix display (both stereo and mono supported)

Audio Editing

- Multi-channel audio editing
- Mono, stereo or four audio channels per timeline track
- Audio waveform display (local workspace only) in with subframe accurate transitions editing
- Up to 16 channel audio input/output
- Digital or analogue style audio scrubbing
- Graphical insert and manipulation of crossfades
- Independent control of out and in fade duration and timing
- Track or segment level control with keyframing and dynamic rubber banding
- 3 band parametric eQ with graphical display
- Audio compression
- Live audio output during level, eQ or compression adjustment
- Flexible mix-down options including track assign and pan for playout
- Voice over record
- Audio loudness monitoring (requires the VisLM VST plugin from NUGEN)

MLTFX

- Pre-visualise multiple effects on a timeline
- Process effects include dve, color, keyer, blur, graphics, text and plugins
- Multiple layer blend modes including additive, subtractive, XOR and multiply
- Add multiple processes with gestural reordering where required
- High quality Quantel plug-ins – Anaglyph, Blend, Blur, Crash Zoom, Directional Blur, Dissolve, filters, Glass Tile, Kaleidoscope, Lens Flare, Magic Crystal, Mesh Warp, Mosaic, Nova, Ripple, Trail, Transition, Water Distortion, Wave, Whirl Pinch and Wind
- Over a thousand 3rd party plugins available
- In context grading across multi-layer timeline
- Colour effects include still store, storyboard, multiple cascade colour layers, ranges control, revolver, fettle, printer lights, HSL keyer, selective keyer, shape selectives, Inside/Outside grading and all are able to be driven via a mouse, pen, Neo or Neo Nano control surfaces
- Colour includes the ability to create and burn in 3D Cubes (LUTS)
- Effects grouping available for all modules
- Point and Mocha area based tracker, including stabilisation
- Stereo Tools including geoFix, geoFix2, keystone correction, autobalance, vergence and floating window controls
- Stereo material can be viewed in the UI in anaglyph, mono difference, mono anaglyph, chequerboard, flicker and half-mix modes. These modes are also available on the full frame output
- Hierarchy of segment, track, and clips effects including dve, key, colour, blur, text and plugins
- Timeline shows clips with effects history
- Real-time previews for reviewing changes
- Keyframes display for each segment locked to MLT zoom
- Keyframe Processes (simplify, densify, smooth, add noise, jitter, quantise, slide, de-extrapolate)
- Keyframe controller (constant, cycle, offset cycle, oscillate, directed)
- Flexible keyframe scaling when trimming
- Keyframes visible in tails
- Tails always available even in rendered history
- All dve numerical values are keyframeable, e.g. keyframeable soft-edged crops
- Text generation can be used as a key in blur and colour
- Enhanced gestural track/layer management
- Solo/Mute individual layers
- Add/Delete key via the timeline
- Background rendering. Either F1 auto render mode or via the render bin.
  (note that background renders may impact play performance)

Primary Color Correction

- Primary colour correction control of hue, saturation, lift, gamma and gain
- Master and individual channel controls
- S-Curve and pivot points for Master and separate R,G and B
- Stereo grading for individual or both eyes
- Separate differential controls for shadows, midtones and highlights
- Simple range (sim range) control where lift controls the shadows, gamma controls the

midtones and gain controls the highlight regions
- All range controls (sim range, shadow, midtone and highlight) can be used in conjunction with one another and the master controls
- Hicon view of shadow, midtone and highlight areas
- Apply optional 3rd party plugins in creative grading sessions
- Red, Green, Blue and Density Printer Light controls with 0.25 point increments
- 9 editable fettle curves, working in RGB,YUV or HSL for complete colour control
- Colourpoint identifies image colours on graphs
- Cascade primary grades to simplify multi-shot grading
- Nullcast/balance for auto-colour balance
- Easy to use inside/outside grading operations
- Linear and logarithmic operation

Secondary Color Correction

- Unlimited cascaded secondary colour corrections
- Blend modes and opacity available on every cascade
- Plugins available on every cascade both inside and outside a key or a shape
- Revolver HSL-based secondary color corrector, multiple simultaneous 'in-picture' modifications (barrels)
- Select input hue and modify output hue, saturation and luminance.
- 12 Revolver presets
- HSL vector selective with RGB channel control of High, Low, High Softness and Low Softness for precise selection
- 10 Vector presets and user presets for HSL
- Blur, shrink and grow selective area
- Freehand or graphic shape selection with unlimited shapes per cascade
- Stereo disparity control for positioning shapes in 3D space
- Variable shape softness (Matinee) for inside and outside the shape
- Manually keyframe or apply tracks to animate shapes
- Mocha tracking - draw a shape and then track
- Group shapes for fast and easy animation
- Individual softness and group softness controls
- Sophisticated shape editing with rotate, scale, point tangents and tension
- Aperture - defocus or sharpen the selected image, key or shape area. Includes separate RGB channel control
- Independent cascade input and hole-cut selection for each cascade – derive key from any layer
- Name cascade layers for easy management
- Enable/disable individual cascades for quick before/after comparisons
- Common tools for primary and secondary grading

Grade Management

- Preview and transfer grades from shot to shot using Still Store, Storyboards or Settings Bin
- Auto-update of reel view when grade changes
- Unlimited reference frames with wipe and rotate split-screen comparison. Transfer grades from reference frames

- Enhanced Reference Frame and Storyboard display that shows both at the same time
- Powerful Group Grade in Effects allows shots to be graded via Originator, Source Timecode, selected Range or manual selection
- Save grades to Storyboard or library with thumbnail image
- Timeline indicator to show Storyboard range displayed
- Up to 6 extra Storyboards can be created and easily switched between and deleted
- Export grade settings with thumbnails to external pen drive or hard drive for easy transfer between systems
- Transfer all or partial settings
- Color Trim in Effects within a selected group. Actively Trim the entire group by the same amount
- Full transition handling with auto-rebuild of transitions after grade changes
- Easily store multiple versions of grades for reference comparison
- Adjustable Undo Interval in milliseconds

Stereo3D

- Stereo multilayer timeline
- Each stereo clip treated as a single clip item
- Timeline and library indictors for stereo clips
- Slip/slide left and right eyes separately on a segment by segment basis
- Swap eyes on a track or segment basis
- Stereo video guide track supported
- Easily view (solo) left and/or right eye on the main output
- Trim, edit and set transitions to both eyes as if a single item
- Stereo viewing modes include halfmix, mono difference, chequerboard, colour anaglyph, mono anaglyph and flicker modes
- Variable flicker rate and variable chequerboard size on output
- Stereo console for measurement of horizontal and vertical disparity in pixels
- Disparity and distance can be displayed as percentages of screen width
- Auto vergence controls. Tap anywhere on the screen to set zero disparity
- Auto geometry fixing tools with a choice of geofix or geofix2
- Vergence, floating window, rotate, push and keystone controls
- Auto color balance – match right to left, left to right or meet in the middle

Painting

- Paintbox™ on-board provides paint and graphics tools
- Paint on layers in their compositing context
- Variable density pressure sensitive brushes for real painting feel
- Pressure sensitive variable size brushes
- Air, chalk, paint and chair brushes
- Wash, shade, smudge, blur and spray functions work with all brush types
- Stencils for protecting areas from painting
- Create hi-con mattes from stencils
- Copy, restore and zip brushes for retouching flexibility
- Combine copy with stencil and smudge with stencil
- Restore from next, previous frame, clip, cut out or buffer

- Pasteup, unlimited cut outs with stencils
- Field or frame painting
- Floating colour palette for instant colour mixing
- Read image colour values in palette, illegal colour display
- HSL colour wheel in palette
- Colour Map
- Create and animate graphical shapes or hand-drawn shapes
- 2 and 4 colour gradients in graphical shapes
- Individual stroke or stroke sequence undo
- User definable grids for accurate alignment and templating
- Paint without swiping

Utilities

- Interlace, de-interlace
- Cinecompress/expand (remove or add 3:2 pulldown)
- Entangle, disentangle
- Freeze, Reverse, Flip and Average
- Separate and combine RGB

I/O and Conform

- Import any size up to 8K
- Store on local workspace any size up to 8K
- 16, 10 or 8 bit non-compressed native storage on disk
- Render on export – no need to render to local workspace to do deliverables
- Export any size up to 8K (8192 x 4320)
- Export of avi, cin, dpx, jpg, mov, mpg, mxf (includes DNxHD), SStP, XDCAM, P2, exr, png, sgi, tga, tif, tiff, vpb, wav, wma, wmv file formats
- Export stereo clips as separate eyes or in side by side mode in any of the above formats
- Support for soft mount of RED, DPX, TIFF, CIN, MXF-wrapped DNxHD, SStP, XAVC, GoPro MP4, P2, Quicktime ProRes, ARRI RAW, Canon RAW, Cinema DNG and XDCAM HD formats
- Resize on export, source size extraction and crops on export, burn in 3D luts on export (XYZ with suitable LUT)
- Choice of box or cut on export based on first frame of the sequence
- User defined Black/White levels on export
- User defined export menu settings (entire export menu snapshot) that can be saved and restored
- Export settings with thumbnail images to transfer to another Quantel system
- QXMLnet utilities allow access to and from Quantel workspace via a scriptable interface
- Direct import of single frames onto desktop with duration setting
- Publish AAF projects to audio post (ProTools) with essence, metadata and video reference file
- Add/Remove or Ignore of underscores from file sequences on import and export
- Export Naming can set an appended name or number to a file sequence (padding)
- Can use names and dots as separators and/or start sequences at any number
- Audio channel mapping control on input

- Autoconform multi-layer AAF files with cuts, dissolves, SMPTE wipes, M2 commands (freeze and varispeed), split edits and comments
- Conform of .stl subtitling files (after convert to aaf) to produce a text metadata track of subtitles
- Choice of stretch method when conforming
- Convert EDLs to AAF for conform
- Intelligent conform only loads material not already loaded
- Source offset for rippling source timecodes
- Multi-level conform priority control for quick handling of editorial changes with reference clip and reference project functions
- Automatic tracking of effects onto new conform via source or destination timecode tracking
- Conform from tape or file media on a network Auto search through network directory structure to find required media
- Filters for file format and resolution on data conforms
- Choice of rush naming conventions on data conforms
- Quick handling of editorial changes with reference clip and reference project metadata to maintain colour grading history during edit-list revisions
- Reference clip conform has option not to extend tails (rush/seg/dest tc options)
- Conform in “Source” or “Dest” load order
- Background conform from network
- View conform as edit list, track list or load order
- Build AAF and EDL of timeline
- Direct import of single frames onto desktop with duration setting
- Background import/export of file media via windows networking protocols.
- Batch import and export
- Compatible with SAN client software and FC HBA (not supplied)
- Conform settings for Arri, Canon, Cineform (raw wrapped avi and mov), F65, Quicktime, Phantom and r3d file formats
- AAF-based project import from FCP 7 via free Automatic Duck Pro Export plug-in with project data interchange including layer structure, transitions, dve, opacity and text
- Archive everything from complete project to individual shots or settings with full, new and minimum options
- Soft mount archive – archives can be viewed across a network and selectively restored.
- Archive can also be placed directly to the clips bin and timeline for editorial and effect changes

Titles

- Scribe software module adds rolls, crawls and lower thirds
- Caption compositor adds multiple titles onto timeline
- Mix text and graphics in rolls and crawls
- Anti-aliased render of international character set
- Use any Windows TrueType font
- Style control and character effects including edge colour, face, shadow, grading, softness, transparency and angle
- Tabs, margin alignment and safe area display for precise layout
- Place text on a spline curve

- Import text from txt or rtf files including tabs
- Import layouts prepared on QScribe standalone software
- Integrated Quantel colour palette
- Support for non-left to right, top to bottom languages

Effects

- The Effects module is provided primarily to support custom transition creation, access to Paint and for compatibility with existing Quantel archives. No development of Effects is planned, new capabilities will be added into the MLTFX module
- The Effects module does not support the Neo Nano panel